PROC. ENTOMOL. SOC. WASH.
93(1), 1991, pp. 1–15

A REVISION OF NEARCTIC CHALCEDECTINI (CHALCIDOIDEA: PTEROMALIDAE) WITH A NEW WORLD CHECKLIST

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Abstract.—Four Nearctic species of Chalcedectini are recognized in two genera: *Dryadochalcis texana* (Brues), *Amotura hyalinipennis* (Ashmead), n. comb., *Amotura maculipennis* (Ashmead), n. comb., and ***Amotura caelata*** Grissell, new species. *Euchrysia* (= *Amotura*) *similis* Girault is synonymized under *A. hyalinipennis.* Each previously described species is redescribed, illustrated for the first time, and the previously undescribed sexes for all species are recognized for the first time. A key to Nearctic taxa is presented, and known geographic and host data are summarized. The Neotropical species *Dryadochalcis superba* DeSantis is discussed in relationship to its early confusion with *D. texana.* A list of 15 New World species (with 8 new combinations) in 3 genera is given.

Key Words: *Amotura, Dryadochalcis,* wood-boring beetles, parasitic wasp

The group now referred to as Chalcedectini (Hymenoptera: Pteromalidae: Cleonyminae) (Boucek 1988) has had a long and varied nomenclatural history. Although relatively distinct in habitus, placement of Chalcedectini in a hierarchical classification has been problematic. At various times they have been recognized as a subfamily of the Cleonymidae (Ashmead 1904), as a subfamily of Podagrionidae (Peck 1951), as a family (Burks 1958, 1967), and as a subfamily of Pteromalidae (Graham 1969). The current placement as a tribe of Cleonyminae (Boucek 1988) is accepted as the basis for this paper.

Chalcedectini are an uncommonly collected group of wasps, presumed to be parasitic on xylophagous beetles. Though rare, the few nearctic species are each widely distributed throughout the Nearctic and northern Neotropical Regions. According to Boucek (1988) the Chalcedectini are circumtropical in distribution with the majority of species found in the Neotropical Region. In the recent Catalog of Hymenoptera in America North of Mexico, Burks (1979) placed 2 genera and 4 species in the tribe. More recently Boucek (1988) revised the generic limits in his treatment of the Australasian genera and species. As a result of his revision, none of the 4 Nearctic species are currently placed in the correct genus.

The intent of this paper is to clarify the generic status of the four described Nearctic species (one of which is synonymized), describe the previously unknown sexes of the three remaining species, describe one new species, and present a checklist of New World taxa with eight new combinations. *Dryadochalcis superba,* a Neotropical species, is discussed in relation to its early confusion with the Nearctic species *D. texana.*

Although I have collected, reared, and accumulated specimens for over 10 years, fewer than 300 nearctic specimens have been seen (from 15 museums). Material was bor-

rowed from the following sources (abbreviations given are used in the text): CAS, California Academy of Sciences, San Francisco, California; CDFA, California Department of Food and Agriculture, Sacramento, California; CNC, Canadian National Collection, Ottawa, Canada; BMNH, The Natural History Museum, London, England; DCD, D. C. Darling Collection, Toronto, Canada; FSCA, Florida State Collection of Arthropods, Gainesville, Florida; MBR, Mueso Argentina de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina; Halstead Collection, J. A. Halstead, Fresno, California; Hespenheide Collection, H. A. Hespenheide, Los Angeles, California; HUM, Hope University Museum, Oxford, England; MLP, Museo La Plata, La Plata, Argentina; ROM, Royal Ontario Museum, Toronto, Canada; TAMU, Texas A & M University; UCD, University of California, Davis, California; UCR, University of California, Riverside, California; UI, University of Idaho, Moscow, Idaho; USNM, National Museum of Natural History, Washington, D.C.

Abbreviations for morphological terms used in the text are: F = flagellomere, MOL = midocellar length (between mid- and hindocelli), OOL = ocellocular length (between hindocellus and eye), POL = postocellar length (between hindocelli), Mt = metasomal tergum. In numbering the metasomal (= abdominal, gastral) terga, I follow the system used by Gibson (1989) wherein Mt1 is the petiole (virtually invisible), Mt2 is the first visible tergum, and Mt7 bears the spiracles. Terga may be difficult to count because in some species (e.g. *Amotura caelata,* Fig. 10) larger terga cover smaller ones, or terga are either fused (Mt8+9) or so closely appressed as to appear fused. These conditions are described for each species.

Chalcedectini

I have seen the types of 11 of the 15 known New World Chalcedectini as well as at least that many undescribed species from the Neotropical Region. Although Boucek (1988) revised the higher classification of the Australasian Chalcedectini, there is still much to learn about the New World forms. In this paper I recognize 3 New World genera: *Dryadochalcis* DeSantis, *Amotura* Westwood, and *Chalcedectus* Walker. Boucek (1988) pointed out that the genus *Chalcedectus* was based solely upon the type-species *Chalcedectus maculicornis* Walker. This Brazilian species has the temple expanded into vertical crests with transverse ridges and differs from *Amotura* in no other discernable way (type in BMNH, examined). I am not convinced that monotypic genera based upon such apparently autapomorphic conditions serve a purpose in understanding evolutionary pathways. Two of the species included in this study (i.e. *A. caelata* and *A. maculipennis*) might just as easily be placed in monotypic genera based upon autapomorphies. Given our limited knowledge of the Chalcedectini, their rareness, and the profusion of diverse morphological types apparent in just the 4 Nearctic species it seems best, at present, not to fragment the group into what would be monotypic genera. Until the New World species are revised, I follow the generic concepts of Boucek (1988) in order to maintain some semblance of nomenclatural stability.

Chalcedectini are recognized by a combination of the following characters: hindfemur enlarged and with teeth along the ventral edge, hindtibia arched, eyes diverging ventrally, antennae inserted nearer to the clypeus than the midpoint of the head, and in females the antenna has an apical spicula. The antennae of both sexes are of diagnostic value, but they vary in appearance depending upon how the specimens are prepared. In critical point dried material (i.e. life-like) the apical clavomere of the female is domed with a membranous sensory region and the spicula is readily apparent. In males, the apical two clavomeres are diagonally truncate and the truncation is developed as a membranous sensory region.

In air-dried specimens the sensory region of both sexes usually collapses. This results in females having a truncate or sunken clava and the spicula may fold over and not be immediately evident. In males, the sensory region invaginates and causes the apex to become triangularly asymmetrical.

Key to Nearctic Chalcedectini

1. Apex of hindtibia without spur, curved outward as pointed projection, inner margin not apparent and tibial comb absent (Fig. 26); in female, Mt8+9 laterally compressed and many times longer than wide (Fig. 11) ..... *Dryadochalcis texana* (Brues)
– Apex of hindtibia with 2 spurs (1 of which may be difficult to see), essentially concave, inner and outer margins of tibial apex equally apparent and tibial comb present (Fig. 25); in female, Mt8+9 not laterally compressed and as wide or wider than long (Figs. 9, 10) ..... *Amotura* Westwood ... 2
2. Hindfemoral teeth large, separated by gaps (Fig. 6); female: Mt2 deeply split medially, longitudinally strigate (Fig. 10); male: metasoma appears composed of 2 equally long terga, Mt2 not medially split, with strong to faint longitudinal sculpturing basally, other tergum strongly transversely strigate ..... *Amotura caelata* Grissell, new species
– Hindfemoral teeth minute, scarcely separated (Figs. 5, 7); female: Mt2 entire medially (Fig. 9), polished; male: with 4 or 5 apparent metasomal terga which are weakly sclerotized and difficult to differentiate 3
3. Axillae and axillulae highly polished, posterior region of scutum with well developed patch of silver setae; forewing with postmarginal vein much shorter than marginal vein (Fig. 20) ..... *Amotura maculipennis* (Ashmead)
– Axillae and axillulae sculptured, posterior region of scutum without patch of silver setae; forewing with postmarginal vein much longer than marginal vein (Fig. 18) ..... *Amotura hyalinipennis* (Ashmead)

Dryadochalcis DeSantis

Dryadochalcis DeSantis, 1970: 25.

Type species.—*Chalcedectes* [sic] *texanus* Brues. Orig. desig.

Although DeSantis (1970) described the genus *Dryadochalcis* for *texanus* this change was not noted in the most recent catalog (Burks 1979) where *texanus* was placed in *Chalcedectus*. The essential characters separating *Dryadochalcis* and *Amotura* are stressed in the key, and I can add one additional differentiating character to separate them. In *Dryadochalcis* the distal segment of the maxillary palpus is right-angled in relation to its point of attachment (Fig. 24), but in *Amotura* the segment is only slightly curved (Figs. 21–23).

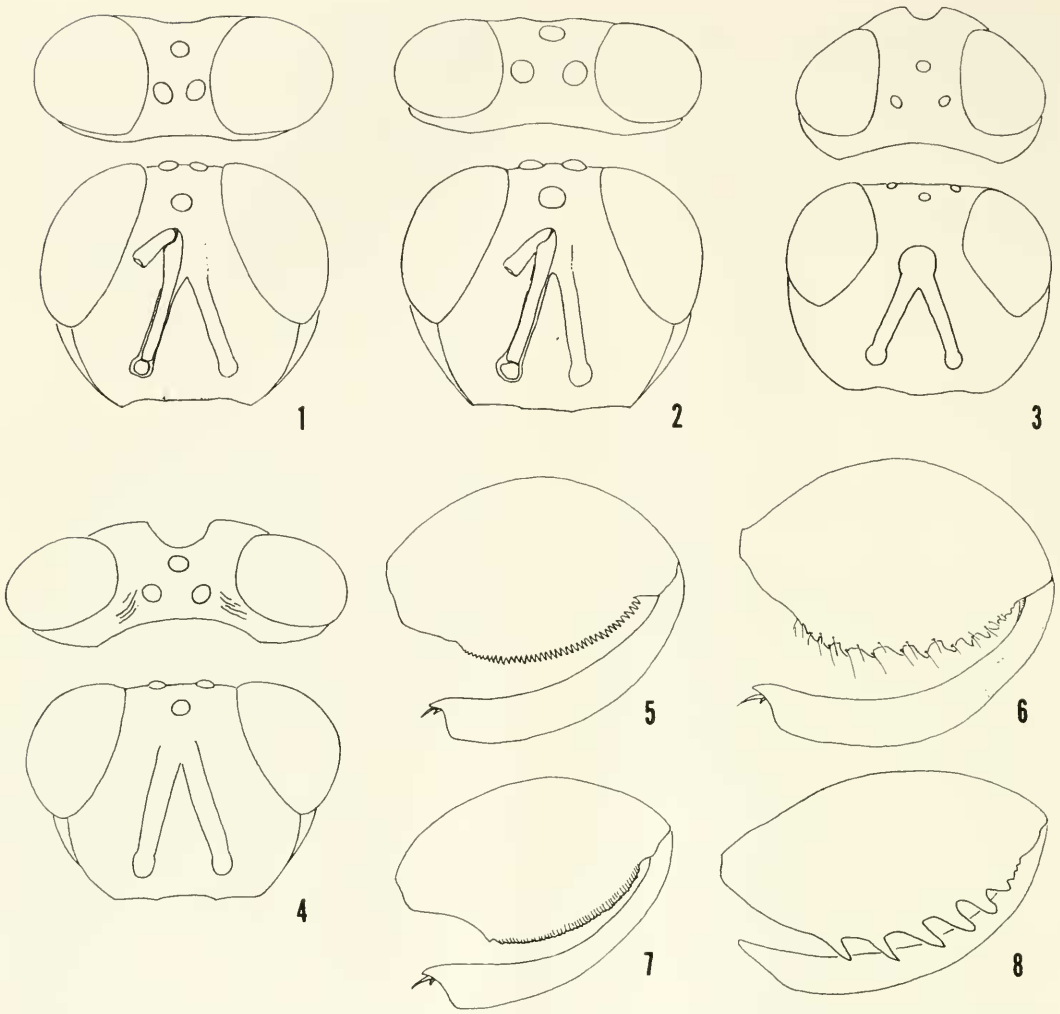
Dryadochalcis superba De Santis (Fig. 12)

Dryadochalcis texanus of DeSantis, 1970: 26 (Figs. 5, 6), 1 ♀ (description of misidentified female specimen as *texanus*).

Dryadochalcis superba DeSantis, 1977: 26. New name for misidentified female *texanus* of DeSantis, 1970 (nec male of Brues 1907). Holotype ♀, Santa Trinidad, Paraguay, MBR. [Examined].

Discussion.—This Neotropical species is included here because of the confusion between it and the Nearctic species *texana*. Brues (1907) described *Chalcedectus texanus* based upon a male collected in Texas. In 1970, DeSantis described what he thought was the female of *texanus* based upon a single female from Paraguay. He also transferred *texanus* to the new genus *Dryadochalcis*. In 1977, DeSantis stated that his 1970 description of the female of "*texanus*" was a misidentification and that this description actually referred to a new species which he named *superba*. I have examined the type of *superba*, as well as female specimens from Argentina and Brazil, and I agree with DeSantis that these specimens represent a species distinct from *texana*. The differences between the 2 are not great and are discussed under *texana*.

Material examined.—In addition to the type specimen I have seen 6 ♀ as follows: BRAZIL: 2 ♀, Amazonas, vic. Manaus, Reserva Ducke, 24–25 July 1981 and 1 August 1981, G. B. Fairchild, flight trap near pond (FSCA); 1 ♀, Tonatins (BMNH); 1 ♀, Ron-



Figs. 1–8. Chalcedectini. 1–4, Heads, frontal and dorsal views. 1. *Amotura busckii*. 2. *A. hyalinipennis*. 3. *A. maculipennis*. 4. *Dryadochalcis texana*. 5–8, Hind femora, outer view. 5. *A. maculipennis*. 6. *A. caelata*. 7. *A. hyalinipennis*. 8. *D. texana*.

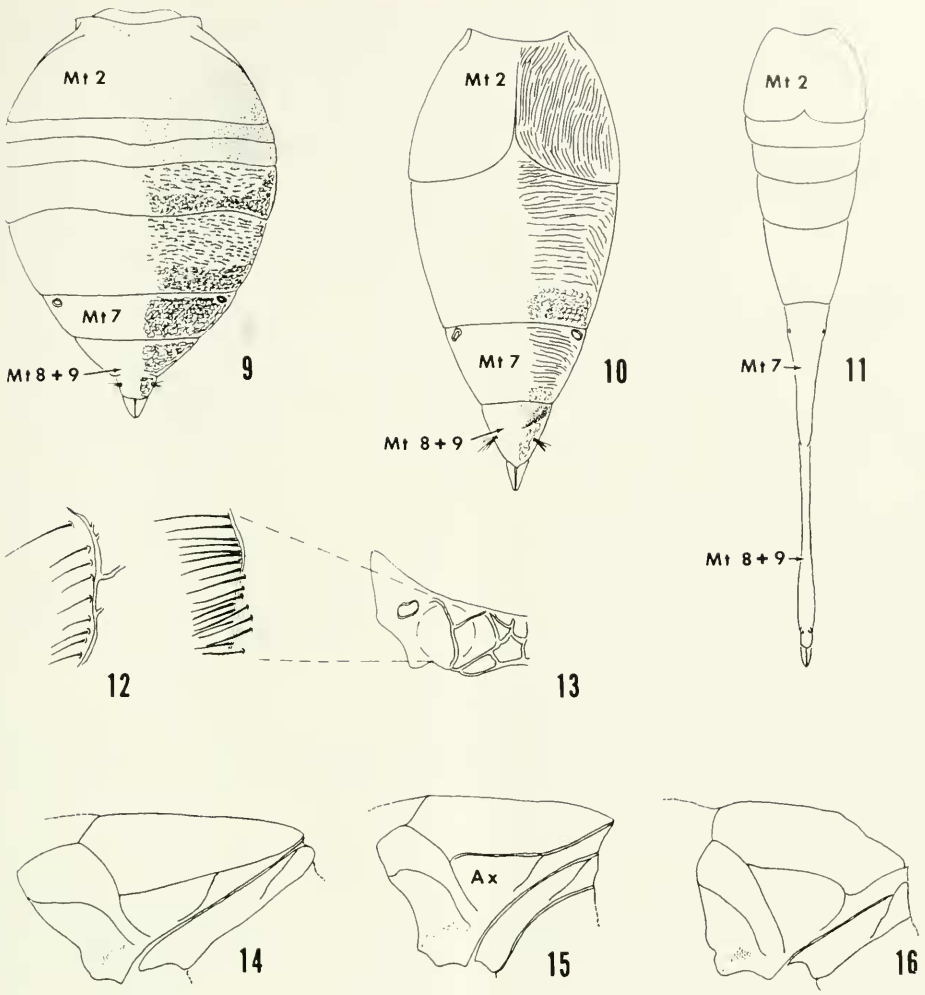
don, 5-IV-1962, F. Plaumann (USNM). ARGENTINA: 1 ♀, Tucuman, Trancas-Tacanas, 1–30-XI-1968, L. Stange (MLP), and 1 ♀, 11 km W. Las Cejas (El Solidad), L. Stange, Malaise trap (FSCA).

Dryadochalcis texana (Brues)
(Figs. 4, 8, 11, 13, 17, 24)

Chalcedectes texanus Brues, 1907: 106–107, 1 ♂. Holotype ♂, U.S.A., Brownsville, Texas, USNM #42714. [Examined].

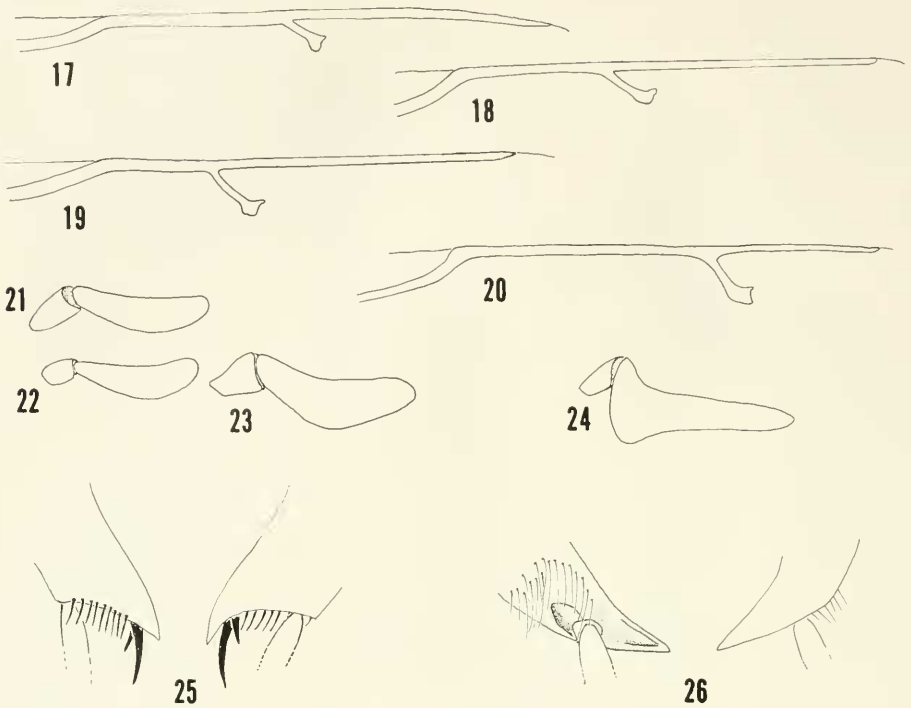
Dryadochalcis texanus (Brues), n. comb.: DeSantis, 1970: 26.

Female (first and only specimen for species).—Length 13.7 mm. COLOR: Metallic violaceous, with blue and green reflections, except as follows: antenna black; wing veins and tarsomeres 2–5 brown; tarsomere 1 white; basal ⅓ of hindtibia faintly mahogany. Wings infuscate brown, most distinct beneath parastigma and marginal vein. SCULPTURE: Head and mesosoma mostly umbilicately punctured, reticulate (reticulate-rugose) on head from dorsum of scrobes to venter of head, mesopleuron smooth in upper half, lower half transverse-



Figs. 9–16. Chalcedectini. 9–11, Metasomas, dorsal view (Mt = metasomal tergum). 9. *Amotura hyalinipennis.* 10. *A. caelata.* 11. *Dryadochalcis texana.* 12–13, Plical carina of propodeum. 12. *D. superba,* detail of carina only. 13. *D. texana,* left half of propodeum with expanded detail of carina. 14–16, Scutellum and metanotum, side view (Ax = axillula). 14. *A. hyalinipennis.* 15. *A. caelata.* 16. *A. maculipennis.*

ly strigate, median area of propodeum heavily rugose; submedian panels of propodeum shiny with a few transverse wrinkles; Mt2 essentially polished, remaining terga with faint transverse striations; hind-femur shagreened with minute, widely spaced punctures. SETATION: Head and mesosoma generally covered with silvery pubescence, dense patch of recumbent setae present behind propodeal spiracle; following areas asetose: scrobes, mesopleuron, median and submedian areas of propodeum; metasomal terga essentially asetose dorsally, laterally with sparse, short setae. STRUCTURE: Head in facial view (Fig. 4) with polished area of scrobes extended to less than ½ diameter of midocellus, area above this with few weak punctures; scrobes laterally sharp nearly entire distance; interantennal area laterally sharp; malar distance 0.7× intermalar distance (19:26) and 0.7× eye height (19:25). Head, in dorsal view (Fig. 4), with OOL:POL:MOL ratio as 5:6:4, ocellocular area with anteriorly curving



Figs. 17–26. Chalcedectini. 17–20, Forewing venation, dorsal view. 17. *Dryadochalcis texana.* 18. *Amotura hyalinipennis.* 19. *A. caelata.* 20. *A. maculipennis.* 21–24, Maxillary palpus, outer view. 21. *A. hyalinipennis.* 22. *A. maculipennis.* 23. *A. caelata.* 24. *D. texana.* 25–26, Hindtibial apex, left = inner view, right = outer view. 25. *Amotura* spp. 26. *Dryadochalcis* spp.

carinae, vertex 0.3× head width (20:60). Eyes bare. Scape essentially cylindrical, 5× as long as wide (55:11), ratio scape : pedicel : F1–9 : apical spicula as 55:18:8:20:12:14:12:11:9:5:4:3, pedicel 3× as long as wide (18:6). Propodeal plica obscured by setae that continue from lateral panel upward over edge of submedian panel (Fig. 13); hindfemur (Fig. 8) 2× as long as wide (60:30, excluding teeth), with 5 large teeth. Forewing almost evenly setose except oval bare area distal to basal cell, lower half of costal cell (on dorsal surface), and area behind cubital vein (basally), ratio SM:M:PM:S as 70:31:40:10 (Fig. 17). Metasoma (Fig. 11) with Mt2–8+9 in ratio of 19:5:6:9:15:30:39 in dorsal view (Mt7 and 8 appear fused dorsally, lateral margins difficult to see), Mt2 slightly emarginate medially, otherwise terga essentially straight on hind margin.

Holotype male.—Body length 6.6 mm. Coloration as for female, except metasoma tinged orange in basal half. Otherwise as for female except as follows: antenna with ratio of scape : pedicel : F1–9 as 44:12:5:14:12:10:8:7:5:4:4 (right antenna missing beyond F1), pedicel 2× as long as wide (12:6), metasoma weakly sclerotized, basal half smooth, distal half faintly alutaceous.

Material examined.—In addition to the type male, I have seen one female from U.S.A., Texas, Cameron County, 2–3 mi. south of Southmost, 7-XII-1978, E. E. Grissell, A. S. Menke, malaise trap, xeric hammock (USNM).

Discussion.—Since its original description in 1907, Brues' species *texana* has been known only from the male. In 1978, Arnold Menke and I trapped a female specimen within a 10 mile radius of the type locality and this is certainly the female of the species. It differs only in expected secondary

sexual characters. Females of *Dryadochalcis texana* differ from those of *superba* in the following characters: in *texana* the propodeal plica (Fig. 13) is obscured by setae that continue from the lateral panel upwards, over the panel, and onto the submedian panel, whereas in *superba* (Fig. 12) the plica is a well-defined, single ridge and the setae which cover the lateral panel do not cross over onto the submedian panel; in *texana* the midocellus is separated from the dorsal apex of the scrobal basin by a nearly smooth area with a few ill-defined punctures immediately below the midocellus, whereas in *superba* there is a sculptured area subequal in width to the midocellus. These characters should work for the male of both species as well, but that of *superba* is still unknown. DeSantis (1977) cited several differences to separate the species involving antennae and hindfemora, but these have not proved adequate.

Amotura Westwood

Polychroma Westwood, 1874: 140.

Type species.—*Polychroma histrionica* Westwood. Des. by Gahan & Fagan, 1923: 117. Preoc. by *Polychroma* Dejean, 1833 (Coleoptera).

Amotura Cameron, 1884: 130–131.

Type species.—*Amotura annulicornis* Cameron. Monotypic.

Polychromatium Dalla Torre, 1897: 88. Replacement for *Polychroma* Westwood.

Episystole Girault, 1927: 317.

Type species.—*Episystole poeta* Girault. Orig. Desig.

Neochalcodectus Masi, 1936: 68.

Type species.—*Neochalcodectus sinaiticus* Masi. Monotypic.

The above synonymy is taken from Boucek (1988) who explained the nomenclatural history of the genus. *Amotura* is now the correct name for all nearctic species previously placed in *Euchrysia* Westwood (Burks 1979). *Euchrysia* (*sensu strictu*) was synonymized with *Agamerion* by Boucek (1988). Girault (1917) published a key to the 3 North American species of *Euchrysia*, but this is no longer useful.

***Amotura hyalinipennis* (Ashmead), New Combination**
(Figs. 2, 7, 9, 14, 18, 21)

Euchrysia hyalinipennis Ashmead, 1896: 231, ?6 ♀. Lectotype ♀ (here designated), Argus Mts., California, USNM No. 3334. [Examined].

Euchrysia similis Girault, 1917: 15, 1 ♀. Holotype ♀, Lawrence, Kansas, USNM No. 20464. [Examined]. *New Synonymy.*

As explained in the variation and discussion sections below, this species appears to be geographically variable. Therefore I have redescribed the species based upon the lectotype of *hyalinipennis* as the standard form against which variation is measured.

Lectotype female.—Body length 4.0 mm. COLOR: General body color black with metallic green reflections especially on face, pronotum, thoracic venter, basal ½ of Mt6; hindfemur tinged purple; yellowish brown are: F1–5, palps, wing veins, tarsomeres 4–5; tarsomeres 1–3 whitish. SCULPTURE: Coarsely reticulate (reticulate-rugose) on head from dorsum of scrobes to venter of head, largest pits *ca* 0.75× diameter of midocellus (on frons reticulation much finer and granular in nature, scrobes transversely reticulate); mesosoma almost evenly reticulate dorsally; transversely strigate are posterior angle of sidelobe (scutum) between notaulus and axilla, and Mt5–6 basally; median area of propodeum heavily rugose; submedian panels of propodeum with a few transversely rugose wrinkles; alutaceous to weakly reticulate are: lower ½ of pronotum laterally, tegula (weakly), venter of mesosoma, lower ⅔ of mesopleuron, axillula (weakly), legs (especially hindfemur), Mt2–4, Mt8–9 (extremely weak, terga appear polished in most views), posterior ½ Mt5–6, and entire Mt7; smooth are subalar area,

upper ⅓ of mesopleuron, dorsellum, nucha. SETATION: Head and mesosoma generally covered with silvery pubescence except following areas bare: scrobes, mesopleural depression, mesepimeron, median and submedian areas of propodeum (laterally with a patch of decumbent setae below spiracle); at least some of the pubescence near hindfemoral teeth noticeably longer than elsewhere on femur; tergal setation as follows: Mt2–6 without dorsal setae, Mt7–9 with sparse dorsal setae, laterally Mt2–5 with a few setae along dorsal edge, Mt6–9 evenly setose. STRUCTURE: Head in facial view with scrobes extended to within 1.5× diameter of midocellus, scrobes well defined laterally, fading dorsally into frons, interantennal area without median carina, laterally well defined, distance between outer margins of hindocelli greater than distance between inner margins of toruli (1.7×, Fig. 2), malar distance 0.9× intermalar distance and 0.6× eye height (20:32), clypeus straight, in dorsal view ratio of OOL:POL:MOL as 1:4:3, frontovertex 0.3× head width (36:120), scape cylindrical in basal ⅓, gradually flattening ventrally in upper ⅓, lateral carina present only on mesal margin in upper ⅓, scape 5.3× as long as wide (53:10), ratio scape : pedicel : F1–9 : apical spicula as 53:20:8:11:11:10:9:8:7:6:6:6, pedicel 2.9× as long as wide (20:7). Pronotum nearly vertical in lateral view, scutellum dorsally flattened, laterally with angled edge which sets off poorly defined, inward sloping face which is obscure where met by dorsellum (Fig. 14), hindfemur (Fig. 7) with numerous, saw-like teeth (each tooth tiny and not free from the next); forewing evenly setose except oval bare area distal to basal cell and area behind cubital vein at base of wing, ratio SM:M:PM:S as 50:18:40:6 (Fig. 18). Metasoma (Fig. 9) in dorsal view widest in basal ⅓, Mt2–9 with ratio of 23:4:5:9:20:12:7:5 (Mt8 and 9 may appear fused), terga essentially straight on hind margins.

Male.—Body length 1.9–3.0 mm. Body color predominantly black with metallic blue or green reflections (or brassy red in south Florida specimens). Otherwise as for female except as follows: antenna with ratio of scape : pedicel : F1–9 as 37:14:4:9:6:6:5:5:5:4:7, pedicel 2× as long as wide (14:7), F2–9 covered with recurved, evenly spaced, silver setae which give the flagellum a shiny appearance in some lights; metasoma weakly sclerotized, Mt2 smooth, Mt3–8 alutaceous.

Type material.—*Euchrysia hyalinipennis* was described from an unspecified number of specimens. Six localities were listed by Ashmead for his new species, and 6 females have type labels in the USNM collection. I consider these the only syntypical material, and designate the specimen from Argus Mts., California as lectotype. This specimen is the only complete one remaining but has its right antenna, left foreleg (beyond coxa), and right hindleg on a slide along with parts of the holotype of *E. similis*. *Euchrysia similis* was described from 1 female which is missing the left wings and right midleg. The left fore- and hindlegs (beyond coxae) and left antenna are on a slide.

Other material examined.—I have examined 70 females and 138 males as follows (specimens in CAS, CDFA, CNC, DCD, FSCA, ROM, TAMU, UCD, UI, USNM): CANADA: Ontario, Quebec. UNITED STATES: California (2 paralectotypes), Arizona, New Mexico, Texas (paralectotype), Kansas (holotype—*similis*), Missouri (paralectotype), Florida, Georgia, North Carolina, South Carolina, Virginia, District of Columbia, New Jersey, and Massachusetts. MEXICO: Baja California Sur, San Luis Potosi, Chiapas, and Yucatan.

Distribution.—This is a widespread and relatively common species known from southern Canada (Ontario) to southern Mexico (Chiapas).

Variation.—Females vary in length from 3.0 to 5.0 mm. Color has been used to distinguish species in *Amotura,* but it is not always reliable. In females, mesosomal color varies from mostly blackish with metallic green or blue-green to brassy-violet (in some

Florida specimens). Girault (1917) separated his species *similis* from *hyalinipennis* primarily by the infuscated forewing of the former and the hyaline forewing of the latter. Additionally, *similis* had flagellomeres all black while *hyalinipennis* had F2–5 reddish brown. In examining almost 200 specimens from the United States and Mexico it is not possible to segregate these two forms by these criteria. Basically, specimens from areas bordering the 40th parallel and from higher elevations tend to have dark antennae and infuscated wings (*similis*) while specimens from lower latitudes and elevations tend to have reddish brown or yellowish flagellomeres and no wing spot (*hyalinipennis*). Specimens from southern California (type locality) have F1–5 yellowish, or occasionally F2–4 are yellowish and F5 is darker yellow basally fading to black apically. Specimens from Texas, Florida, and lower elevations of Mexico have only F2–4 yellowish with F5 always black. Interpretation of the brownish (or yellowish) coloration, however, is fairly subjective. In some instances the color is outstanding in contrast to the remainder of the flagellum. In others, flagellomeres 2–4 are merely slightly lighter in color relative to the remainder. In all males the antenna is completely black (but with conspicuous silver setae). I see little practical application in using antennal coloration for delimiting species. Interpretation of the forewing infuscation is equally subjective in my opinion. It is not a matter of a distinct spot or its position, but rather the degree of intensity. Even the darkest infuscation is pale at best, and only visible under certain lighting (e.g. transmitted backlighting).

In females the distance between the outer margins of the hindocelli averages 1.4× longer than the distance between inner margins of the toruli (1.3–1.7×, n = 10), the width of the frontovertex compared to the breadth of the head averages 0.30× (0.29–0.31, n = 10) and is independent of body size, and the malar to intermalar distance averages 1.0× (1.0–1.1, n = 10).

I have seen exceptionally flattened individuals of this species in series of specimens from the same locality. In some cases the propodeum is nearly in the same plane as the scutellum. This arises, I believe, due to the host tunnel (in stems or twigs) being too shallow for normal pupation of the wasp. If pupation occurs, the resultant adult would be deformed. Flattened specimens have been collected as free-living individuals.

Based upon available specimens, the following descriptive material may be added to the description for the lectotype female: pronotum in dorsal view without apical carina, with median polished longitudinal line (almost a carina), nearly diagonal strigose sculpture radiates from this line; scutellum laterally with distinct carina which fades towards posterior apex; hindcoxa without dorsal carina, outer face alutaceous and asetose.

Hosts.—There are few specific rearing records for this species. The published records (Burks 1979) include: Buprestidae: *Chrysobothris deleta* Leconte, *C. mali* Horn; Cerambycidae: *Oncideres rhodosticta* Bates. Records taken from examined specimens are: *Polycaon confertus* LeConte (Bostrichidae) in *Manzanita* (California), and *Dicerca* and *Chrysobothris* (Buprestidae) in *Rhamnus californica* Eschscholtz, ex stems of fire-damaged *Desmanthus illinoensis* (Michaux) MacMillan (Texas), ex pecan twig (Texas), ex citrus limbs (Florida), ex *Gleditsia* stems (New Jersey), ex *Quercus dumosa* Nuttall stems (California), ex dead stems of *Pinus ponderosa* Douglas and *Pseudotsuga menziesii* (Mirbel) Franco (California), and ex mesquite stems (California).

Discussion.—Yoshimoto (1984) reported a "possible new species of *Chalcedectus*" as the first Canadian record for the Chalcedectinae (= Chalcedectini). I have examined those specimens and they are *Amotura hyalinipennis*. Darling (1988: 2814, 2819) dis-

cussed the phylogenetic implications of the labrum of this species (as *Euchrysia*). I have seen a voucher specimen (ROM collection) from this study and it is correctly identified.

Amotura hyalinipennis can easily be distinguished from other nearctic species by characters given in the key. It is most similar to the Puerto Rican species *A. busckii* which is known only from 5 specimens. A simple color character separates both sexes of both species: in *A. hyalinipennis* the scutellum is concolorous with the scutum, usually black to blackish green, whereas in *A. busckii* the scutellum contrasts markedly in color with the scutum (the former brilliant metallic brassy red to green, the later brilliant blue to purple-blue). It is not known if these color extremes represent geographic variation or not. The only morphological differences that I can find are on the head of females (cf. Figs. 1, 2). In *A. hyalinipennis* the distance between the outer margins of the hindocelli is about 1.4 times greater than the distance between the inner margins of the toruli (range 1.3–1.7, n = 10, Fig. 2), whereas in *A. busckii* this distance is about 0.9 times (range 0.8–0.9, n = 4, Fig. 1). Also in females, the width of the frontovertex compared to the face width is greater in *A. hyalinipennis* (0.29–0.31, n = 10) than in *A. busckii* (0.20–0.25, n = 5). These differences are not striking and may not be valid. I have seen only 1 male of *A. busckii* and they do not hold up for males.

Amotura maculipennis (Ashmead), New Combination
(Figs. 3, 5, 16, 20, 22)

Euchrysia maculipennis Ashmead, 1896: 231, ♂. Lectotype ♂ (here designated), Santa Cruz Mountains, California, USNM No. 3335. [Examined].

Female.—Body length 2.1–3.0 mm. COLOR: Body metallic green to copper, some specimens with purple reflections (especially from Florida); brown are: scape and pedicel (both may have metallic reflections), apex of club, legs (except femora may be brownish yellow), wing veins, and well-defined infuscation beneath marginal vein extending to hind margin of wing; flagellomeres and tegula brownish yellow. SCULPTURE: Densely reticulate (fine to granular) are: head from dorsum of scrobes to venter of head, scutum, dorsum of scutellum; highly polished are: axillae, axillulae, and apical vertical face of scutellum; polished with widespaced pits are: sides of head and frons; median propodeum vertically carinate, submedian panels polished and with irregular carinae; Mt2–3 essentially polished, remainder weakly alutaceous as are legs. SETATION: Body covered with short, silvery pubescence except bare are: scrobes, mesopleuron, median and submedian areas of propodeum, dorsum of Mt2–8+9; posterior half of scutum covered with dense, silvery pubescence, much more noticeable than elsewhere on body. STRUCTURE: Head in facial view (Fig. 3) with frons flat, meeting lower face at angle, scrobes ending at least 4 or 5 diameters before midocellus, scrobes well defined to top, interantennal area well defined laterally, malar distance subequal to intermalar distance and *ca.* 0.6× eye height, clypeus straight, in dorsal view (Fig. 3) ratio of OOL:POL:MOL *ca.* 1:4:3, frontovertex *ca.* 0.33× head width, scape almost 6× as long as widest point in lateral view, ratio scape : pedicel : F1-9 : apical spicula as 40: 13:3:6:6:6:6:5:4:4:3:3, pedicel *ca.* 2× as long as wide. Pronotum vertical in lateral view, with prominent, sharp carina across anterior margin, scutellum bulging higher than scutum, apically with vertical face almost as wide as dorsellum (Fig. 16), hindcoxa with delicate dorsal carina (more prominent basally), hindfemur ventrally on outer edge with numerous, minute teeth each distinct from the next (Fig. 5); forewing essentially bare from parastigma to base of wing, basal vein with setal line, ventral surface of costal cell with several complete setal rows, ratio SM:M:PM:S as 45:20:11:5 (Fig. 20). Meta-

soma about as for *hyalinipennis* (as in Fig. 9), all terga straight on hind margins.

Male.—Body length 1.9–2.3 mm. Differing from female only in that the forewing is essentially hyaline.

Type material.—The number of specimens in the type series was not stated, but the word "types" was used. In the USNM there are 3 male specimens all from Santa Cruz Mountains, California and with USNM "type" labels. I consider this to be the extant type series. As no holotype was designated, I have designated one specimen as lectotype with a handwritten lectotype label.

Other material examined.—I have seen 23 ♀ and 7 ♂ of this species from the following localities: MEXICO: 1 ♀. Coahuila, 33 mi. SE Saltillo, nr. Jame, 25 July 1963, H. & A. Howden (CNC). U.S.A.: ARIZONA: 1 ♀. Cochise Co., Huachuca Mts., Sunnyside, 31 August 1981, 6234 ft., D. C. Darling (DCD). CALIFORNIA: 1 ♀, Los Angeles Co., Claremont, Baker (USNM); Tulare Co., Ash Mountain Power Station #3, 3 June and 11 August 1984, R. D. Haines (2 ♀, 1 ♂), same but 1 and 8 October 1982, R. D. Haines, J. A. Halstead (1 ♀, 1 ♂) (all Halstead Collection). FLORIDA: Alachua Co., Gainesville, 1 ♂, 28 December 1972–4 January 1973, H. V. Weems, Jr., insect flight trap, 1 ♀, 24 March, W. H. Pierce, Malaise trap (FSCA), 2 ♀, 2 ♂, 17–30 April 1987, D. Wahl, Malaise trap (CNC), 2 ♀, 4–18 June 1987, D. Wahl (CNC); Dade Co., 1 ♀, Fuch's Hammock, near Homestead, T. S. Dickel and H. V. Weems, Jr., flight trap (FSCA), 1 ♀, S. Miami, 21 February–1 June 1986, S. & J. Peck, flight intercept trap (CNC). MARYLAND: 1 ♀, Montgomery Co., Bethesda, ex *Call*[*irhytis*] *crypta* (Ashmead) (Cynipidae) (USNM). NEW MEXICO: 1 ♀, Lincoln Co., 4 km W Alto, 25 July 1982, G. Gibson (CNC). NORTH CAROLINA: 1 ♀, Northampton Co., 7 km S. Jackson, 10 July/23 September 1987, BRC Hym. Team, flight intercept trap, bald cypress swamp (CNC). TEXAS: 1 ♀, Brazos Co., College Station, 25 March 1967, J. C. Schaffner (TAMU); 4 ♀, 2 ♂, Cameron Co., 1 mi. S. Southpoint Ranch, 5–6 July 1982, G. Gibson (CNC); 1 ♀, Montgomery Co., 8 mi. S. Conroe, 6–12 April, 1987, Wharton, Wang, Praetorius (TAMU); 1 ♀, Somervell Co., 10 mi. W. Glen Rose, 2 May 1975, J. C. Schaffner (TAMU).

Distribution.—This species, although uncommonly collected, appears to be widespread across the entire southern half of the United States and extends into northern Mexico (Saltillo).

Host.—The record cited above for Cynipidae is possible, though suspect. Several other species of *Amotura* have been associated with oak, but without specific host association. *Amotura hyalinipennis* was reared from stems of oak and *A. caelata* was taken feeding at honeydew of oak galls. The true host is most likely a beetle of some sort, but this remains to be demonstrated.

Discussion.—*Amotura maculipennis* is distinctive among New World Chalcedectini based upon the highly polished axillae and axillulae, the relatively short postmarginal vein (compared to marginal), the flattened and angled frons, the bulging scutellum, the patch of silver setae on the posterior of the scutum, and the basally bare forewing. No other known species has any of these characters, and the species is so distinctive that it does not appear to be related to any other New World taxon.

Amotura caelata Grissell, New Species
(Figs. 6, 10, 15, 19, 23)

In the following description, numbering of metasomal terga is based upon the true tergal position, not the apparent number. Thus, visible tergum 3 is actual metasomal tergum 7 (Fig. 10). Mt3–5 are weakly sclerotized and are covered by Mt2.

Holotype female.—Body length 6.6 mm. COLOR: Entirely black with faint purplish blue reflections on face and mesosomal dorsum; brown are: flagellomeres 1–4, wing

veins, tarsomeres 3–5; whitish are: tarsomeres 1–2, basodorsal spot on hindfemur (Fig. 6). SCULPTURE: Coarsely reticulate (reticulate-rugose) on head from dorsum of scrobes to venter of head, largest pits *ca.* 0.5× diameter of midocellus, on frons reticulation much finer and granular in nature, scrobes transversely reticulate; mesosoma evenly reticulate dorsally; Mt2 (Fig. 10) longitudinally strigate, transversely strigate are anterior ¾ of Mt6 and Mt7; median propodeum heavily rugose vertically, submedian panels of propodeum heavily rugose transversely; alutaceous to weakly reticulate are legs (especially hindfemur); smooth are subalar area, upper ¾ of mesopleuron, nucha. SETATION: Entire body covered with short silvery pubescence except asetose are: scrobes, mesopleuron, median and submedian areas of propodeum (laterally densely covered with semierect setae below spiracle), dorsum of metasoma; pubescence on hindfemoral teeth (both inner and outer row) noticeably longer than elsewhere on femur (Fig. 6). STRUCTURE: Head in facial view with scrobes extending to within 1.5 diameters of midocellus, scrobes well defined laterally fading dorsally into frons, interantennal area without median carina, laterally well defined, malar distance 1.0× intermalar distance and 0.6× eye height, clypeus straight, in dorsal view ratio of OOL:POL:MOL as 4:15:13, frontovertex 0.36× head breadth, scape cylindrical in basal ⅓, gradually flattening ventrally in apical ⅓ and with lateral carina on mesal margins, scape 4.5× as long as widest point in lateral view, ratio scape : pedicel : F1–9 : apical spicula as 46:17:7:10:9:8:6:5:4:3:3:3, pedicel 4.3× as long as wide. Pronotum nearly vertical in lateral view, without anterior carina, scutellum dorsally flat, apically with angled edge that sets off inward sloping face as wide as dorsellum (Fig. 15), hindcoxa without dorsal carina, hindfemur ventrally on outer edge with 9 or 10 prominent teeth and several minute sawlike teeth (Fig. 6); forewing evenly setose except oval bare area distal to basal cell and area behind cubital vein bare for ⅓ length of hindmargin of wing from base to apex, ratio SM:M:PM:S as 100:23:61:10 (Fig. 19). Metasoma (Fig. 10), in dorsal view, widest in basal ⅓, only 4 terga visible (Mt2, 6, 7, 8+9) with ratio of 8:12:7:5, Mt2 deeply emarginate, remainder straight on hind margin.

Male.—Body length 2.9–4.3 mm. As for female except metasoma which differs as follows: Mt2 and Mt7 occupy almost entire length of metasoma (Mt3–6 hidden under Mt2, rarely one may be visible as narrow band), each comprising about half metasomal length, Mt2 without median emargination, at least basal half lightly sculptured but sculpture may reach apex, Mt7 strongly transversely strigate (as in female).

Type material.—Holotype ♀, USNM; U.S.A., California, "Pinon Flat, Santa Rosa M," 21-V-41, D. J. and K. N. Knull Collrs. Paratypes, 16 ♀, 33 ♂ as follows: U.S.A.: ARIZONA: Graham Co., 1 ♀, 0.9 mi. along rd. to Marijilda Canyon from hwy. 666, H. B. Leach (CAS); Pima Co., 1 ♂, Florida Wash, 1 August 1979, C. L. Bellamy (Hespenheide Collection); Santa Cruz Co., 1 ♀, 2 mi. N. Nogales, 2 September 1981, 3865 ft., on *Helianthus,* D. C. Darling (Cornell University Collection). CALIFORNIA: Tulare Co., 3 ♀, 2 ♂, Ash Mountain, Kaweah Power Station (No. 3), May, Aug., Sept., and Oct. 1982–83, J. A. Halstead, R. D. Haines, D. J. Burdick (Halstead Collection); Monterey Co., 1 ♀, Carmel Valley road (1 mi. NW Arroyo Seco road), 11 May 1967, H. J. Leach, ex dead *Quercus* containing *Psoa quadrisignatus* (Horn) (Bostrichidae); Riverside Co., 1 ♀, 4 ♂, San Timoteo Canyon, 13–14 Sept. 1972, M. Wasbauer, A. Hardy, at honeydew of *Disholcaspis eldoradensis* (Beutenmeuller) (Cynipidae) galls on *Quercus lobata* Nee (CDFA); Imperial Co., 1 ♀, Westmoreland, 31 May 1930, P. H. Timberlake, on *Phacelia* (UCR); 1 ♀, 1.5 mi. W. Winterhaven, 18 June 1978, C. Bellamy (Hespenheide Collection). FLORIDA: Alachua Co., 2 ♂, 2 mi. N. Gainesville, 27

August and 25 September 1974, H. Davis and W. Jetter, ramp trap; Highlands Co., 1 ♀, 4 ♂, Archbold Biological Station, 19–22 March 1987, D. Wahl (American Entomological Institute, CNC); Marion Co., 1 ♀, 4 ♂, 9 mi. SSW. Ocala, Kingsland Country Estates, 19 September to 19 October 1975, J. Wiley, Malaise trap in turkey oak (FSCA); Monroe Co., 1 ♂, Big Pine Key, 10 April 1970, W. W. Wirth, Malaise trap (USNM), also 1 ♀, 1–31 October 1985 and 2 ♂, 1–31 February 1986, S. & J. Peck, mangrove hardwood transition (CNC); Osceola Co., 1 ♀, Ocala, 24 Oct. 1914 (USNM). NEW MEXICO: Dona Ana Co., 1 ♀, 5 mi E. Las Cruces, 12 April 1965, R. M. Bohart (UCD); Hidalgo Co., 1 ♂, 4 mi. S. Rodeo, 28 June 1969, V. D. Roth (Hespenheide Collection) and 1 ♀, Rodeo, 28 August 1959, 4000 ft., H. E. Evans (DCD); 4 ♂, 9.3 mi. W. Animas, 26–30 July 1982, G. A. P. Gibson, sweeping *Chilopsis linearis* (Cavanilles) Sweet (CNC). TEXAS: Cameron Co., 2 ♂, 2.3 mi. S. Southmost, 8 Dec. 1978, E. E. Grissell, A. S. Menke, ex stem *Desmanthus illinoensis* (USNM); Uvalde Co., 1 ♀, 3 mi. NW Uvalde, 4 May 1977, T. Eichlin, W. Wasbauer, Malaise trap (CDFA). MEXICO: Baja: 1 ♂, 4.6 mi. E. Valle de Trinidad, 26 May 1979, C. L. Bellamy (Hespenheide Collection); 1 ♂, 25 mi. W. La Paz, 30 August 1959, K. W. Radford, F. G. Werner (CAS). OAXACA: 1 ♂, Puerto Escondido, 15 July 1985, J. Woolley, G. Zolnerowich (TAMU); SAN LUIS POTOSI: 2 ♂, 7 mi. S. Ciudad Valles, 20 December 1970, P. H. and M. Arnaud (CAS); SONORA: 1 ♀, 1 ♂, 10 mi. SE. Alamos, 29 June 1963, F. D. Parker, L. A. Stange (UCD).

Other material examined (too poor to designate as type material).—ARIZONA: 1 ♀, Portal, 18 June 1956, R. and K. Dreisbach (USNM). CALIFORNIA: 1 ♂, Los Gatos, 28 October 1918, H. E. Burke, ex pupal cell *Chrysobothrus mali* Horn (Coleoptera: Buprestidae) (USNM).

Etymology.—From the Latin *caelo,* meaning engraved, in reference to the sculpturing of the metasoma.

Hosts.—*Amotura caelata* has been reared from a pupal cell of the buprestid *Chrysobothrus mali,* from dead *Quercus* containing *Psoa quadrisignatus,* and from dead stems of *Desmanthus illinoensis.* It would appear to be a parasite of wood boring beetles.

Variation.—Females of *caelata* vary in length from 4.5 to 6.6 mm. The coloration appears stable throughout the entire geographic range, except that Florida specimens are weakly purplish overall rather than black. In females the yellow spot on the apex of the hindtibia varies from ¼ to ⅓ the tibial length. In males the color is less obvious (⅕ to ⅙ tibial length) and, in a few cases nearly disappears. Rarely, in some females, one of the hidden metasomal terga (Mt3–5) is visible in the emargination of Mt2.

Discussion.—It is of interest that both *A. caelata* and *A. hyalinipennis* have been reared from the same plant stems and locality (*Desmanthus illinoensis* in Southmost, Texas) at the same time. These two species and *A. maculipennis* have also been collected at the same locality in California (Tulare County, Ash Mountain Power Station), but not at the same time: *A. caelata* was collected in May, September, and October; *A. hyalinipennis* in August; and *A. maculipennis* in October.

Darling (1988: 2814, 2819–2820, 2832) discussed the phylogenetic implications of the labrum of this species which he referred to as "*Chalcedectes* [sic] sp." He illustrated the free labrum (his Fig. 20) which he considered the plesiomorphic state among Chalcidoidea. I have seen the specimen (in DCD collection) upon which his discussions were based and can confirm that it is *Amotura caelata.*

Among Nearctic species, *A. caelata* superficially resembles *A. hyalinipennis.* It is, however, distinct in the structure of the metasoma (Fig. 10, especially the emargination of tergum 1 and the strigate sculpture), the apex of the scutellum (Fig. 15, brim-like,

angled apex), and the hindfemora (Fig. 6, enlarged, separated teeth). These characters are unique among Nearctic species, but the character states of the tergal emargination, scutellum, and hindfemur can be found in Neotropical species in different combinations. Because the tropics seem to be the center of diversity for Chalcedectini, a thorough analysis of characters and states must await a study of Neotropical species.

Checklist of New World Chalcedectini

I have seen the types of all specimens except *guaraniticus* Strand (discussed by Boucek 1959), *septemdentatus pallidipes* Roman, and *annulicornis* Cameron. The type locality follows depository.

Amotura

annulicornis Cameron.—*Amotura annulicornis* Cameron, 1884: 131. BMNH: Nicaragua.

annulipes (Ashmead) n. comb.—*Chalcedectes annulipes* Ashmead 1904: 483. USNM: Brazil, Matto Grosso.

busckii (Ashmead) n. comb.—*Euchrysia busckii* Ashmead, 1900: 256. USNM: Puerto Rico.

caelata Grissell.—See text.

guaraniticus (Strand) n. comb.—*Polychromatium 16-dentatum* var. *guaraniticum* Strand, 1911: 95. Berlin Zoological Museum: Paraguay.

histrionicus (Westwood) n. comb.—*Polychroma histrionica* Westwood, 1874: 141. HUM: Brazil, Para.

hyalinipennis (Ashmead).—See text.

lanei (DeSantis) n. comb.—*Chalcedectus lanei* DeSantis, 1970: 22–23. MLP: Brazil, Serra do Navio.

maculipennis (Ashmead).—See text.

regalis (Westwood) n. comb.—*Polychroma regalis* Westwood, 1874: 141. HUM: Brazil, Amazonas.

sedecimdentatus (Westwood) n. comb.—*Polychroma 16-dentata* Westwood, 1874: 141. HUM: Brazil, Para.

septemdentatus (Westwood) n. comb.—*Polychroma 7-dentata* Westwood, 1874: 142. HUM: Brazil, Amazonas.

?*7-dentatus pallidipes* Roman. *Chalcedectus 7-dentatus* var. *pallidipes* Roman, 1920: 12. Type depository ?: Brazil, Amazonas. (Syn. questionable, see Boucek 1959.)

Chalcedectus Walker

maculicornis Walker.—*Chalcedectus maculicornis* Walker, 1852: 47. BMNH: Brazil, Para.

Dryadochalcis DeSantis

texana (Brues).—*Chalcedectes texanus* Brues, 1907: 106–107. USNM: U.S.A., Texas.

superba DeSantis.—*Dryadochalcis superba* DeSantis, 1977: 26. MBR: Paraguay, Santa Trinidad.

Acknowledgments

During the overly long course of this study I have had many people to thank (abbreviations refer to museums listed in the introduction). Of special note are L. DeSantis (MLP), Z. Boucek (BMNH), and M. Graham (HUM) who loaned me valuable type material; M. Fritz (MBR) who located specimens that were not easily found; and the following curators who represent the spirit behind their museum's acronym: Paul Arnaud (CAS), D. Chris Darling (ROM), Gary Gibson and Carl Yoshimoto (CNC), Saul Frommer (UCR), Robert Schuster (UCD), Lionel Stange, J. Wiley, and Harold Greenbaum (FSCA), Marius Wasbauer (CDFA), and Jim Woolley (TAMU). Additionally I thank Chris Darling, Jeff Halstead, and Henry Hespenheide for loaning material from their private collections. I thank Bob Gordon and Dick White for helping with names of Coleoptera. I am also grateful for the reviews of this manuscript provided by R. V. Peterson, P. M. Marsh, D. C. Darling, and G. A. P. Gibson.

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